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The invention relates to a heat-transfer agent for an automobile with fins/tubing block, whereby all tube ends of the flat tubes for a laminar and flush Aneinanderliegen expanded are, with two Sammelkästen, composed from flat tubes and waving ribs, which are in each case to the opposite faces fins/tubing block on the tube end fitted, whereby those spread Sammelkästen the tube end flush final, as well as with two side portions, which extend at least over the length fins/tubing block and attach to opposite sides to the fins/tubing block.

Such a heat-transfer agent is in the not before-published DE 195 43 986,4 described. The heat-transfer agent exhibits fins/tubing block, which are composed from a variety of flat tubes as well as between these disposed waving ribs. The tube ends of the flat tubes are on both faces fins/tubing block on a rectangular free cross section in such a manner expanded that the formed in each case prolonged sides of the tube ends of adjacent flat tubes together-lie laminar and to aligned, so that on both faces a tube end package results fins/tubing block in each case. This tube end package becomes on both faces of in each case a Sammelkasten spread, which is in such a manner dimensioned that it is put onable flush final with the narrow sides of the tube ends. At the sides fins/tubing block are side portions disposed, which are addable either outer or inside to the closed side regions the Sammelkästen.

Object of the invention is it to create a heat-transfer agent that initially mentioned type which exhibits a simplified structure and therefore a simplified production.

This object becomes dissolved by the fact that each Sammelkasten is open designed to its - on the longitudinal axis based - side regions, and that the side portions at their opposite ends exhibit to the Sammelkästen of conclusion sections, which the open side regions the Sammelkästen locks. By the solution according to invention it is possible to arrange the Sammelkästen significant simplified since they do not have to exhibit closed side regions more. Rather the conclusion sections of the side portions take over a locking of the side regions. The solution according to invention creates the prerequisites for a machine assembly of the heat-transfer agent, whereby a significant more economical production becomes achieved. Also by the simple construction the Sammelkästen with open front ranges becomes the manufacture expenditure for the heat-transfer agent reduced. By adding the side portions to the gilled pipe block also functional locking of the side regions becomes the Sammelkästen achieved in simple manner. Thus a simple positioning and alignment of the individual components of the heat-transfer agent are possible. Either first putting the Sammelkästen on on the fins/tubing block and subsequent setting of the side portions can take place or however first adding the side portions and subsequent putting the Sammelkästen on on the before-added unit from side portions and fins/tubing block.

In aspect of the invention each open side region the Sammelkästen one exhibits identical inner contour at least over a certain axial length - on longitudinal axis of each Sammelkastens based -, and each conclusion section of the side portions is provided with a conclusion outline, which is adapted to the inner contour of the associated side region in such a manner that the conclusion sections are insertable into the side regions flush. This embodiment is particularly favourable, if those are likewise Sammelkästen like the fins/tubing block and the side portions from metal manufactured and in a common soldering operation with that fins/tubing block and the side portions soldered become. Preferably those are Sammelkästen, the side portions and the fins/tubing block at least in their regions plumb bob-plated which can be joined. The Sammelkästen, the side portions and the fins/tubing block becomes already assembled before the actual soldering operation, whereby the side portions by bands or other chucks at the sides fins/tubing block held are. In this joined, however not yet soldered assembly the conclusion sections of the side portions already lock the side regions the Sammelkästen. Because the inner contour is the Sammelkästen over a certain axial length identical designed, can induce itself the side portions and concomitantly the conclusion sections of the side portions during the soldering process still around a certain amount axial to the center fins/tubing block, without the flush conclusion goes in the region the Sammelkästen lost. This is particularly favourably, there during the soldering process by the flow of the solder layers a setting movement fins/tubing block and the side portions oh savings allele to the longitudinal axes the Sammelkästen to the center fins/tubing block made, whereby by a suitable chuck, in particular by the bands, an axial adjusting of the side portions made. Thus an extremely measure-precise and operator-safe production of the heat-transfer agent is achieved. Additional one becomes despite simple production a good tightness of the solder joints ensured.

In other aspect of the invention the side regions of each Sammelkastens securing elements are associated to the axial

support - on the longitudinal axis of each Sammelkastens based - of the inserted conclusion section of each side portion. These securing elements are in particular favourable to integrities of the individual components of the heat-transfer agent construction unit before a fixed connection by a corresponding soldering process. The securing elements serve thus for it, an integrity the assembly from the Sammelkästen in particular to obtain fins/tubing block and the side portions in a pre-assembly stage and thus before the actual soldering operation.

In other aspect of the invention integral support-lax provided formed at the side regions of each Sammelkastens as securing elements, which are transferable by a deformation strength from a release position aligned with the inner contour of the side region into the respective conclusion section an axial rear safeguard position, are. This is a particularly simple and operator-safe embodiment, which gets along by the Anformung of the support-lax at the Sammelkasten without additional components.

In other aspect of the invention the conclusion sections of the side portions on height of the securing elements are provided with corresponding guide members, whereby the securing elements and the guide members in the safeguard position interlink. The securing elements and the guide members are in such a manner one on the other tuned that additional are to an axial fuse of the side portions to the Sammelkästen the Sammelkästen against a release in longitudinal direction fins/tubing block and thus in longitudinal direction of the flat tubes secured, whereby a positioning accurate to size of all components of the heat-transfer agent results to each other.

In other aspect of the invention the side portions from side profiles as well as rigid with these connected end sections composed are, whereby the end sections form the conclusion sections and in extension of the ends of the side profiles to these attached are. It is possible to manufacture the side profiles as simple longitudinal sections in an extruding or a bending procedure whereby the manufacture expenditure for the side portions is more reducible.

Other advantages and features of the invention result from the Unteransprüchen as well as from the subsequent description of a preferred embodiment of the invention, which is shown on the basis the designs.

Fig. 1 shows an embodiment of a heat-transfer agent according to invention in the region its opposite Sammelkästen,

Fig. 2 a plan view on the heat-transfer agent after Fig. 1 toward the arrow II in Fig. 1,

Fig. 3 a view of a side portion of the heat-transfer agent after the Fig. 1 and 2 in arrow direction III after Fig. 1,

Fig. 4 an other view of the side portion after Fig. 3 toward the arrow IV in Fig. 3,

Fig. 5 a plan view on a side region of a Sammelkastens of the heat-transfer agent after Fig. 1,

Fig. 6 a view of the side region toward the arrow VI in Fig. 5, and

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Fig. 7 a view of the side region after Fig. 6 toward the arrow VII in Fig. 6, whereby support-lax into its safeguard position bent is.

A heat-transfer agent after the Fig. 1 to 7, which is performed with the represented embodiment as Wasserkühler for an automobile, points in accordance with Fig. 1 an upper Wasserkasten 1 as well as one likewise as Sammelkasten serving lower Wasserkasten 2, serving as Sammelkasten, up. Between both Wasserkästen the 1, 2 extended itself fins/tubing block 3, which are 4 composed from a variety of parallel longitudinal flat tubes 5 as well as between these disposed waving ribs to each other. Both the Wasserkästen 1, 2 and the fins/tubing block are manufactured from plumb bob-plated aluminium sheet.

In the region the Wasserkästen 1, 2 are all tube ends of the flat tubes 5 in such a manner expanded that identical, rectangular free cross sections result, whereby the prolonged sides adjacent tube ends together-lie laminar and the narrow sides of all tube ends 6 on in each case a face fins/tubing block to 3 on opposite sides with one another aligning in each case. The fins/tubing block 3 including the tube ends 6 is the corresponding not before-published DE 195 43 986,4 designed.

Both Wasserkästen the 1, 2 are in each case designed as simple, U-well-behaved profiles (Fig. 7), whereby it both to the tube ends 6 fins/tubing block 3 and to their axial faces on longitudinal axis a L of each Wasserkastens 1, 2 based - open designed is. The open faces of each Wasserkastens 1, 2 form side regions 10, which are through as conclusion sections serving end sections 9 from side portions 7 sealed. The side portions 7 as well as their insertion into the side regions 10 the Wasserkästen 1 and 2 become subsequent more near described.

The upper Wasserkasten 1 is provided with an entrance connecting piece 11 as well as one - on the longitudinal axis L based - axial offset discharge part 12, which is lateral to respective openings of the Wasserkastens 1 dense appended. Around a separation between entrance and withdrawal range of the Wasserkastens 1 to obtained, a not more near referred separating wall is 1 provided inside the Wasserkastens in a separation region 19. As from Fig. 7 is more discernible, is the separation region 19 by bend-like, rippenförmige stamping formed, at which a separating wall can push 1 away inside the

Wasserkastens. Also the lower Wasserkasten 2 is provided with a separation region 20, which exhibits analogue rippenförmige stamping, which do not exhibit closer function however with the represented embodiment for the Wasserkasten 2.

Like in particular from Fig. 7 is more discernible, exhibits the side regions 10 of each Wasserkastens of 1, 2 up to the center each Wasserkastens outgoing from their end edge 1 in axial direction the longitudinal axis L seen - a constant inner contour, whereby leg of the U-well-behaved profile of each side region attaches 10 with a larger curvature to a side of the head of the profile than the other leg. The two conclusion sections 9 of each side portion 7 exhibit an external contour serving as conclusion outline, which is exact to the inner contour of the associated side region 10 of each Wasserkastens 1, 2 adapted. Each conclusion section 9 is designed as tongue-like sheet metal part from aluminium, which is symmetrical to the expansion of the tube end angled (Fig. 1). At the outer periphery of each conclusion section 9 a circumferential plant flange 17 provided, the rectangular abragt of the conclusion section 9 is and to the inner contour of the side region 10 of each Wasserkastens 1, 2 adapted conclusion outline 12 of each conclusion section 9 defined. In addition the plant flange 17 serves for the stiffener of the conclusion section 9. As from Fig. 1 is more discernible, is the conclusion sections 9 to both Wasserkästen the 1, 2 in such a manner positioned that they limit the outside waving rib 4 on each side fins/tubing block 3 and against respective tube end 6 of the corresponding outside flat tube 5 rest. From respective tube end 6 runs the plate-like bottom of each conclusion section 9 in parallel extension of the flat tubes 5 rectangular for longitudinal axis the L of each Wasserkastens 1 up to the side of the head of the side region 10 of each Wasserkastens 1. The plant flange 17 rises up outward in each case up to the end edge of the respective side region 10 off and locks with its end edge with the end edge of the respective side region 10. The outside of the plant flange 17 rests to circumferential laminar against the inner contour of the side region 10 of each Wasserkastens 1.

Each side portion 7 is from an u-shaped side profile 8 as well as in extension of the side profile 8 at this set conclusion sections 9 composed. The conclusion sections 9 are properly matching into the opposite faces of the u-shaped side profile 8 inserted and by means of a rivet joint 13 as well as by two solder tacks 14 with the side profile 8 connected. In the side profiles 8 9 in each case two each other opposite punching out are 15 provided following the conclusion sections, which serve for the determination from fasteners to the support of the heat-transfer agent in the automobile.

In order to secure the Wasserkästen 1, 2 and the side portions 7 in their position relative to each other as well as in its common position relative to that fins/tubing block 3 before a soldering of the entire unit, are at the end edges of each side region 10 on opposite sides and on same height two support-lax 18 punched, those with the side walls of each Wasserkastens 1 and concomitantly with the inner contour of the associated side region 10 aligning. On same height each receiving portion exhibits 9 two in their dimensions to the support-lax 18 adapted receiving grooves 16, those on same height on two opposite sides in the plant flange 17 punched is (in particular Fig. 4).

To the assembly of the heat-transfer agent those are postponed Wasserkästen 1, 2 on the respective tube ends 6 in longitudinal direction of the gilled pipe block 3 and thus in longitudinal direction of the flat tubes 5 and the side portions 7 from opposite sides at the fins/tubing block 3 attached. The conclusion sections 9 of the side portions 7 axial - on the longitudinal axis L of each Wasserkastens 1, 2 based - are slid 2 into the open side regions 10 the Wasserkästen 1, until the end edges of the plant flanges 17 and the side regions lock 10 flush with one another. Now the support-lax 18 becomes inward pressed around the bottom edges of the associated receiving grooves 16 around, whereby them the plant flange 17 of the respective conclusion section 9 rear and umkrallen. Since the support-lax 18 properly matching into the receiving grooves 16 engage represents, the support-lax 16 safeguard claws, which load the conclusion sections 9 of the side portions 7 - on the longitudinal axis L based - to of axial to the center each Wasserkastens 1, 2 and the fuse the Wasserkästen 1, 2 in longitudinal direction fins/tubing block 3 positive on the other hand and thus in longitudinal direction of the flat tubes 5 offer, so that the individual components are already also assembled without the subsequent soldering operation to a compact unit. With the help of a chuck the side portions become 7 now in particular by the use of bands transverse to the longitudinal direction fins/tubing block 3 loaded, whereby the entire fins/tubing block becomes 3 on pressure in transverse direction loaded. During the subsequent soldering process those begin solder laminate the different plumb bob plating to flow, whereby a setting movement of the entire unit made, one pushing, D together. h. adjusting the side portions and fins/tubing block 3 in transverse direction fins/tubing block 3 to its center effected. Since the inner contours of the side regions 10 and the plant outlines 12 of the conclusion sections 9 of the side portions are 7 one on the other tuned, the dense conclusion of the side regions 10 remains the Wasserkästen 1, 2 by means of the conclusion sections 9 also during the soldering process obtained. Thus a simple and by machine feasible production and soldering of the heat-transfer agent become achieved.

The heat-transfer agent represented on the basis the before described embodiment can become also for other transducer media except waters and air, how this is with the present embodiment the case, inserted. For this in particular air/air heat-transfer agents is mentioned. Of course the term used for the cooling liquid must become "waters" with the knowledge of an expert understood with the represented embodiment, so that the water can to be either with certain additions offset or be able however in place of water other cooling liquids provided to be.



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1. Heat-transfer agent for an automobile with fins/tubing block, whereby all tube ends of the flat tubes for a laminar and flush Aneinanderliegen expanded are, with two Sammelkästen, composed from flat tubes and waving ribs, which at opposite faces fins/tubing block on the tube end fitted are in each case, whereby those spread Sammelkästen the tube end flush final, as well as with two side portions, which extend at least over the length fins/tubing block and attach to opposite sides to the fins/tubing block, characterised in that each Sammelkasten (1, 2) to its - on its longitudinal axis (L) based - side regions (10) open designed are, and that the side portions (7) at their opposite ends to the Sammelkästen (of 10) conclusion sections (9) exhibit, those the open side regions (10) the Sammelkästen (1, 2) lock.

2. Heat-transfer agent according to claim 1, characterised in that each open side region (10) the Sammelkästen (1, 2) one at least over a certain axial length - on longitudinal axis (L) of each Sammelkastens (1, 2) based - identical inner contour exhibits, and that each conclusion section (9) of the side portions (7) is provided with a conclusion outline (12), which in such a manner is to the inner contour of the associated side region (10) adapted that the conclusion sections (9) are insertable into the side regions (10) flush.

3. Heat-transfer agents according to claim 1 or 2, characterised in that the Sammelkästen (10) with the tube ends (6) fins/tubing block (3) and the conclusion sections (9) of the side portions (7) dense are solderable.

4. Heat-transfer agents according to claim 3, characterised in that the side regions (10) of each Sammelkastens (1, 2) securing elements (18) to at least axial support - on the longitudinal axis of each Sammelkastens (1, 2) based - of the inserted conclusion section (9) of each side portion (7) associated are.

5. Heat-transfer agents according to claim 4, characterised in that as securing elements integral at the side regions (10) of each Sammelkastens (1, 2) formed support-lax (18) provided are, which are transferable by a deformation strength from one with the inner contour of the side region (10) aligned release position into the respective conclusion section (9) an axial rear safeguard position.

6. Heat-transfer agent according to claim 3, characterised in that the conclusion outline (12) of each conclusion section (9) by one axial extending plant flange (17) formed is - on the longitudinal axis (L) of each Sammelkastens (1, 2) based -, which locks laminar with the inner contour of the respective side region (10).

7. Heat-transfer agents according to claim 5 or 6, characterised in that the conclusion sections (9) of the side portions (7) on height of the securing elements (18) with corresponding guide members (16) are provided, whereby the securing elements (18) and the guide members (16) in the safeguard position interlink.

8. Heat-transfer agents according to claim 7, characterised in that the plant flanges (17) of the conclusion sections (9) also as guide members serving receiving grooves (16) are provided, which are the support-lax (18), for an engagement, to the dimensions of the support-lax (18) adapted.

9. Heat-transfer agents after at least one of the preceding claims, characterised in that the side portions (7) from side profiles (8) as well as rigid with these connected end sections (9) composed are, whereby the end sections form the conclusion sections and in extension of the ends of the side profiles (8) to these attached are.